

## **KAATSU Cuff Tightness and Limb Anthropometry: Effect on Blood Flow Restriction**

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KAATSU resistance training involves low loads (20% 1RM) and partial blood flow restriction (BFR). When applying a BFR cuff, the initial cuff tightness (ICT) is important. ICTs can potentially impact the degree of BFR (%BFR) caused by the subsequent inflation to the target training pressures. It's known that limb anthropometrics can affect the amount of BFR that is produced at specific pressures. Understanding the interaction between limb anthropometrics and ICT is an important first step in standardizing BFR dose between individuals for KAATSU training prescription.

**Purpose:** To determine what limb anthropometrics (circumference, muscle or fat composition) have the greatest effect on %BFR with various ICTs.

**Methods:** Forty-two volunteers (26 men, 16 women) provided informed consent. Caliper skin folds (anterior and posterior), Gulick tape circumferences, and peripheral quantitative computed tomography (pQCT) scans were performed on the randomly assigned ipsilateral arm and leg at the level of the KAATSU cuff. %BFR was measured via pulse-wave Doppler ultrasound at baseline (no cuff) and at 5 ICT pressures (20, 30, 40, 50 and 60mmHg). Variable relationships were assessed using Pearson correlations and stepwise linear regression.

**Results:** The dependent variable for regression analysis was %BFR at each ICT. pQCT-determined muscle ( $R^2 = .147, .614, .445, .360, \& .232$ , respectively) and fat composition ( $R^2 = .138, .587, .429, .338, \& .220$ , respectively) were significant ( $p < .05$ ) determinants of BFR at all ICT pressures in the arm. At 30mmHg, circumference was also a determinant ( $R^2 = .163$ ). There were no significant correlations between %BFR and any of the ICT pressures for the leg. pQCT fat composition and sum of skin folds correlated significantly ( $r = .915, p < .05$ ). pQCT circumference and Gulick circumference measures correlated significantly ( $r = .991, p < .05$ ).

**Conclusion:** Arm anthropometrics impact the %BFR created by 5 ICTs in the arm. Skin fold measures and circumference measures were highly correlated with pQCT data. As a result, skin fold and Gulick circumference measures can be used to predict arm composition at the level of the cuff and may inform prescription of appropriate ICTs that result in more consistent initial %BFR across individuals.